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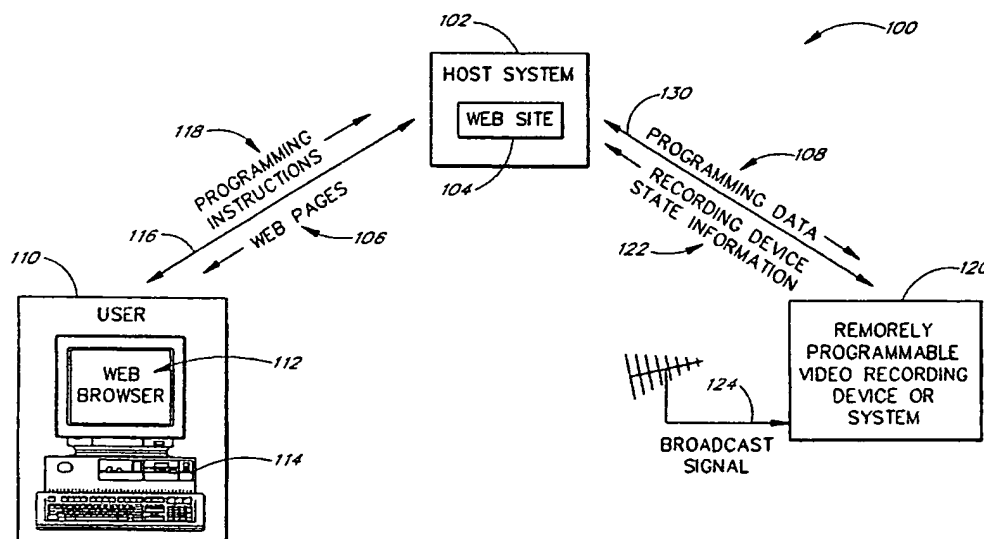
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(54) Title: USE OF WEB PAGES TO REMOTELY PROGRAM A BROADCAST CONTENT RECORDING SYSTEM



(57) Abstract: A remotely programmable broadcast content recording system (120) is programmed through a web page (106) to record broadcast content such as television programs. Accordingly, a user (110) can select content of interest and program the system from almost any location using a web browser (112). A host system (102) hosts a web site (104) through which the user can browse program listings and select content. In response to the selection of a program by the user, the host system creates programming data and transmits the programming data to the user's recording system. The recording system can be configured to receive transmissions from the host system. A client programming module configured to receive the transmissions can be used to program a conventional recording device. The recording system can be supplemented with a web server and an Internet connection to provide a point of presence on the World Wide Web through which the system can be directly programmed.

the identification in channel, date, time, and length (CDTL) format in conjunction with the recorder identifier and transmits the CDTL data and identifier in a vertical blanking interval of a broadcast signal. The user's recorder receives the CDTL data and identifier through the broadcast signal, and upon recognizing a matching identifier, stores the CDTL data to enable subsequent automatic recording of the identified program.

5 Although Hoff and Ng do disclose systems that enable the remote programming of a VCR, they do not present the user a selection of available broadcast from which to choose. Furthermore, these systems require a telephone call to be placed, which is a very inconvenient manner in which to program a VCR.

The present invention seeks to address the aforementioned deficiencies in the prior technology in addition to providing previously unavailable advantages and conveniences.

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Summary of the Invention

A remotely programmable broadcast content recording system is programmed through a web page to record broadcast content such as television programs. Accordingly, a user can select content of interest and program the system from almost any location using a web browser. A host system hosts a web site through which the user can browse program listings and select content of interest. In response to the selection of a program by the user, the host system creates programming data and transmits the programming data to the user's recording system. The recording system can be configured to receive transmissions from the host system. A client programming module configured to receive the transmissions can be used to program a conventional recording device. The recording system can be supplemented with a web server and an Internet connection to provide a point of presence on the World Wide Web through which the system can be directly programmed.

20 One embodiment of the invention is a method of programming a remotely programmable content recording system to record broadcast content. The method includes (a) receiving a programming instruction transmitted over a computer network by a user computer in response to a user's input to the user computer. The programming instruction identifies broadcast content that has been selected by the user to be recorded by the remotely programmable content recording system. The method also includes (b) using the received programming instruction to program the remotely programmable content recording system to record the identified content.

25 The following aspects can, but need not be included in the aforementioned embodiment. The user's input can be received through a web browser executing on the user computer. The user's input to the user computer can include a selection of a user-selectable display element. The method can also include transmitting a web page to the user computer, wherein the web page is configured to cause the web browser to display the user-selectable display element. The method can also include transmitting a programming web page to the user computer in response to a request transmitted by the user computer, wherein the programming web page includes code configured to cause the web browser to display to the user an identification of the broadcast content. The programming web page can also include code that configures the web browser to receive the input from the user. The method can also include serving a state web page in response to a request transmitted by the user computer, wherein the state web page includes code configured to cause the web browser to display state information descriptive of a state of the remotely programmable content recording system. The state information can include an amount of storage capacity available on the recording system for recording new content. In the method, (b) can be performed by the remotely programmable content recording system. The computer network can be the Internet. The programming instruction can identify a broadcast television program. The programming instruction can identify a time period and a broadcast channel. The programming instruction can include a VIDEO PLUS code. The broadcast content can be broadcast television content. The broadcast content can be audio content. The broadcast content can be digital video content. The broadcast content can

wherein the programming web page includes code configured to cause the web browser to display to the user an identification of the broadcast content. The programming web page can also include code that configures the web browser to receive the input from the user. The host system can also include a computer system comprising a processor and an operating system, wherein the server, the control module, and the communication module are configured to operate under the control of the computer system. The computer network can be the Internet. The broadcast content can be broadcast in encrypted form. The control module can be further configured to transmit a content decryption key to the remotely programmable content recording system, wherein the content decryption key can be used to decrypt the broadcast content. The control module can also be configured to encrypt the content decryption key to enable secure communication of the key to the remotely programmable content recording system. The server and the control module can be integrated.

One embodiment of the invention is a remotely programmable broadcast content recording system. The system includes a programmable broadcast content recording module. The system also includes a server configured to receive a programming instruction transmitted over a computer network by a user computer, wherein the programming instruction is transmitted in response to a user's input to the user computer, and wherein the programming instruction identifies broadcast content that has been selected by the user to be recorded by the programmable content recording module. The system also includes a communication module configured to enable access to the server to be initiated from a computer network.

The following aspects can, but need not be included in the aforementioned embodiment. The server can be a web server and the user's input can be received through a web browser executing on the user computer. The web server can be configured to serve a programming web page to the web browser in response to a request transmitted by the web browser, wherein the programming web page includes code configured to cause the web browser to display to the user an identification of the broadcast content. The programming web page can also include code that configures the web browser to receive the input from the user. The server can also be configured to provide programming data to the recording module, wherein programming data are based at least upon the programming instruction, and wherein the programming data identify the broadcast content. The recording system can also include a tuner configured to receive and decode a broadcast signal. The recording system can also include a computer system including a processor and an operating system, wherein the programmable broadcast content recording module, the server, and the communication module are configured to operate under the control of the computer system. The computer network can be the Internet. The programmable broadcast content recording module can include a digital video codec and a hard disk drive. The recording system can also include a digital broadcast signal receiver.

One embodiment of the invention is a hypertext link configured such that a traversal of the link causes a programming instruction to be transmitted over a computer network, wherein the programming instruction identifies a broadcast content unit, and wherein the programming instruction is configured to cause the identified broadcast content unit to be recorded by a remotely programmable broadcast content recording system.

One embodiment of the invention is a web page. The web page includes an identification of a content unit scheduled to be broadcast. The web page also includes code that configures a web browser to transmit a programming instruction in response to input from a user, wherein the programming instruction is configured to cause a remotely programmable content recording system to record a broadcast of the content unit.

The following aspects can, but need not be included in the aforementioned embodiment. The content unit can be identified in a clickable broadcast program grid. The clickable broadcast program grid can depict broadcast programs based upon at least broadcast time and broadcast channel.

- IV. Communication Link
- V. Distribution of Proprietary Content
- VI. Program-Identifying Links and Banner Advertisements
- VII. Program Request Integration
- 5 VIII. Broadcast Scheduling
- IX. Recording Other Types of Content
- X. Web Server Enabled Video Recording System
- XI. Alternative and Additional Embodiments
- XII. Conclusion

10

Brief Description of the Drawings

Figure 1 illustrates one embodiment of the present invention including a remotely programmable video recording system that is remotely programmed by a user through a host system.

15 Figures 2A-C illustrate three example web pages from one embodiment of a web site through which the recording system can be programmed.

Figure 3 illustrates a functional block diagram of one embodiment of the host system including a control module, a host communication module, and a web server.

Figure 4A illustrates a process that is preferably performed by the host system to remotely program a video recording system.

20 Figure 4B illustrates a preferred process performed by the user and the web browser to remotely program the video recording system.

Figure 5 illustrates one embodiment of the remotely programmable video recording system in the form of a remotely programmable video recording device.

25 Figure 6 illustrates a process that is preferably performed by the remotely programmable video recording device of Figure 5.

Figure 7 illustrates an alternative embodiment of the remotely programmable video recording system in the form of a client programming device that programs a conventional video recording and replay device.

Figure 8 illustrates a process that is preferably performed by the client programming device of Figure 7.

30 Figures 9A-E illustrate five embodiments of a communication link through which the host communication module and the client communication module communicate.

Figure 10 illustrates one embodiment of a system for distributing proprietary or paid content.

Figure 11 illustrates a method for distributing proprietary content.

Figure 12 illustrates a system in accordance with which a program-identifying hypertext link can be located anywhere on the World Wide Web.

35 Figure 13 illustrates a system in accordance with which users can request that certain content be broadcast through a scheduling system.

Figure 14 illustrates one embodiment of the invention in which a content recording device is supplemented with a web server to provide a point of presence on the World Wide Web.

broadcast content in accordance with the programming instructions 118 supplied by the user 110. The host system 102 transmits the programming data 108 to the video recording system 120 over a communication link 130. Any communication link 130 capable of supporting communication from the host system 102 to the video recording system 120 can be used. The communication link 130 can be, for example, a telephone system, a computer network, an open-air broadcast television system, a cable television system, a satellite television system, a pager system, or any combination thereof. Various embodiments of the communication link 130 are described in Section IV below.

The communication link 130 preferably also supports transmission of data from the video recording system 120 back to the host system 102. In this configuration, the video recording system 120 can send state information 122 back to the host system 120 for presentation to the user 110 through the web site 104. The state information 122 can include, for example, the used and available recording capacity of the video recording system 120.

The video recording system 120 preferably includes a digital video recording device or an analog video recording device, in addition to a communication module. The video recording system 120 is described in further detail in Section III below. The video recording system 120 receives a broadcast signal 124, preferably through a television antenna, cable television, or satellite television. The video recording system 120 records video content from the broadcast signal 124 in accordance with the programming data 108 received from the host system 102. The video recording system 120 preferably also has playback capability that allows recorded content to be presented on a television or other display device.

Figures 2A-C illustrate three example web pages from a one embodiment of the web site 104. Figure 2A illustrates a Login Page 200, which prompts a user for identification information 202, such as a user ID, and authentication information 204, such as a password. In an alternative embodiment, the function of the Login Page 200 can be achieved by depositing an identifying web browser cookie on the user's web browser 112 and later receiving the identifying cookie.

Upon entering the identification information 202 and authentication information 204, the user clicks on a Login button 206, which, upon a successful login, preferably brings the web browser 112 to a Clickable Programming Page 210, as illustrated in Figure 2B. The Programming Page 210 preferably displays a program grid 212. The program grid 212 preferably lists broadcast programs that are receivable by the user's video recording system 120. Channels are preferably listed along a left column, times are preferably listed along a top row, and program blocks are preferably listed across rows in the body of the grid 212. The time periods displayed by the grid 212 are preferably changed by clicking on arrows in the upper left and upper right hand corners of the grid 212. The date of the grid 212 is preferably changed through pull-down menus 214 displayed above the grid 212. Grids displaying such information are provided by TV Guide Online on its web site. In addition to displaying program information, the program grid 212 is preferably clickable such that a user can select a program to be recorded by clicking upon the depicted program. An Update Page button 216 preferably allows the user's selection(s) (programming instructions 118) on the Clickable Programming Page 210 to be updated on the host system 102. A Transmit button 218, performs the same function as the Update Page button 216 and, in addition, causes the host system 102 to transmit programming data 108 to the video recording system 120.

On a setup page (not illustrated) of the web site 104 the user 110 can preferably set preferences such as:

1. the user's locality and the type of broadcast video signals the user receives on his video recording system (e.g., user lives in city X and receives broadcast signals through cable company Y);
2. an identification number or code for the user's video recording system 120 that allows the host system 102 to identify and transmit programming data 108 to the video recording system 120; and
3. the brand, model, and/or configuration of the user's video recording system 120.

The control module 310 preferably controls the web server 302 as well as the host communication module 312. The control module 310 preferably creates programming data 108 based upon the programming instructions 118. The programming data 108 may also be based upon the brand, model, and/or configuration of the user's video recording system 120. The programming data 108 are configured to represent the programming instructions 118 and any other data necessary for programming the video recording system 120 in a format suitable for transmission over the particular communication link 130 being used.

The control module 310 preferably communicates the programming data 108 to the host communication module 312 for transmission to the video recording system 120. In one embodiment, the communication link 130 is implemented as a broadcast system in which all of the video recording systems receive all of the programming data 108 for all of the video recording systems. In this case, the host communication module 312 preferably prefixes the programming data 108 for each video recording system 120 with an identifier for that particular system. Each video recording system identifies programming data 108 intended for it by examining the prefixed identifier. The programming data 108 can be also encrypted to ensure privacy during transmission. In another embodiment, a computer network is used as the communication link 130. In this case, the control module 310 may also provide addressing data that may be required to direct the programming data 108 to the user's specific video recording system 120.

In one embodiment, VCR-Plus or similar technology is integrated into the video recording system 120. In this case, the programming data 108 are preferably VCR-Plus codes. When a video recording system 120 receives programming data 108 including a VCR-Plus code, the system 120 records the program identified by the code.

Figure 4A illustrates a process 400 that is preferably performed by the host system to remotely program a video recording system 120. At a step 402, a user is associated with a particular remotely programmable video recording system 120. Step 402 may be performed by an account representative, such as when the user 110 sets up an account with a programming service. Alternatively, the step 402 may be performed during an on-line registration process through the web site 104. The user preferably supplies video recording system identification information that allows the host system 102 to transmit programming data 108 to the user's video recording system 120. Depending upon the technology used to implement the communication link 130, the identification information can be: a telephone number, in the case a telephone system is used; a media access control (MAC) address or an Internet Protocol (IP) address, in the case a computer network is used; an identifying prefix, in the case an open-air, cable, or satellite television signal is used; or a pager phone number, in the case a pager infrastructure is used. Various embodiments of the communication link 130 will be discussed in greater detail in Section IV below. Once the user 110 has signed up for the service and provided the required information at the step 402, the user 110 can program his remotely programmable video recording system 120.

At a step 404, the host system 102 identifies and preferably authenticates the user 110 in order to associate the user 110 with an account and a particular video recording system 120. In the embodiment illustrated in Figure 2A, the identification of the user 110 is preferably performed through the Login Page 200. At the Login Page 200, the user supplies a User.ID 202 and a password 204 for authentication.

The step 404 can alternatively be accomplished through the use of web browser cookies. In this configuration, the host system 102 deposits an identifying cookie on the user's web browser 112 preferably during the on-line registration process. The identifying cookie allows subsequent identification of the user 110. When the user requests a web page from the web server 302, the user's web browser 112 submits the cookie to the web server 302 allowing the web server 302 to identify the user 110 in accordance with step 404.

replay module 502 may also be implemented as an analog video recorder using technology similar to that used in present VCRs.

The recording and replay module 502 preferably includes a tuner 504 capable of receiving and decoding a broadcast signal. The tuner enables the module 502 to receive and record an input broadcast signal 506, such as, for example, a signal broadcast over open-air television (e.g., from a transmission tower), cable television, or satellite television. The tuner is preferably capable of receiving and decoding a broadcast signal. The recording and replay module 502 preferably also includes a decryption module 508 that can be used to decrypt encrypted broadcast content. The recording and replay module 502 produces an output signal 510 upon playback or replay of recorded video content.

The client control module 520 preferably controls the video recording and replay module 502 through a processor 522, which may be a microprocessor or microcontroller. The client control module 520 preferably also serves as an interface to allow direct manual use of the video recording and replay module 502 possibly through a hand held remote control and possibly on-screen menus. The client control module 520 preferably includes a client communication module 524, which receives transmissions from the host system 102. The processor 522 preferably processes received programming data 108 and controls the recording and replay module 502 in accordance with the received data 108. In the case that the programming data 108 is transmitted over the same broadcast medium as the content to be recorded, the client communication module 524 is preferably also connected to receive the input broadcast signal 506. In one embodiment, the client control module 520 is enabled with VCR-Plus technology. The programming data 108 in this case can simply be formatted as VCR-Plus codes.

In the case that the communication link 130 supports transmission of data from the video recording device 500 to the host system 102, the processor 522 can be configured to transmit state information 122 to the host system 102 through the client communication module 524. In the case that the communication link 130 does not permit transmission of data to the host system 102, the recording capacity of the device 500 may eventually be used up. Once the device reaches capacity, the processor 522 can be configured to automatically delete content using any number of schemes, such as least recently viewed or recorded.

The client control module 520 is preferably also configured to receive secure communications from the host system 102. The processor 522 is preferably configured to execute decryption code that allows encrypted communications from the host system 102 to be decrypted using a decryption key or code. A corresponding encryption key or code can be supplied to the host system 102 by either the user 110 or the manufacturer of the video recording device 500. Accordingly, programming data 108 can be transmitted in a secure, encrypted form.

A secure communication channel also allows the host system 102 to transmit decryption keys for encrypted video content to the video recording device 500. As will be described in Section V below, the broadcast of encrypted content in conjunction with the supply of decryption keys to video recording devices 500 through the communication link 130 enables a pay per view type system with video on demand like capabilities. In conjunction with the pay per view configuration of the present invention, the video recording and replay module preferably also includes a data counter 507, which counts the amount of data from a proprietary program that has been replayed or presented. The data counter 507 is used to measure usage of proprietary content for billing purposes as will be discussed in Section V below.

Figure 6 illustrates a process 600 that is preferably performed by the remotely programmable video recording device 500. At a step 602, the video recording device 500 receives programming data 108 from the remotely located host system 102 over a communication link 130. The receipt in the step 602 by the video recording device 500 corresponds to the transmission in the step 410 (Figure 4) by the host system 102. At a step 604, the video recording device 500 records broadcast content in accordance with the programming data 108, which may be one or more VCR-Plus codes. At a step 606, the video recording

communication link 130. The receipt in the step 802 by the client programming device 702 corresponds to the transmission in the step 410 (Figure 4) by the host system 102.

At a step 804, the processor 706 preferably creates programming commands 710 based at least upon the received programming data 108 and preferably based upon the brand and model of the recording and replay device 750. In the case the recording and replay device 750 is capable of processing VCR-Plus codes, the processor 706 can simply format the VCR-Plus code for the particular model of recording and replay device 750. Alternatively, the host system 102 may be configured to create the programming data 108 based upon the brand and model of the video recording device 750. In this case the processor 706 may not have to create the programming commands but instead only relay the programming commands 710 to the data port 708 for transmission to the recording device 750. At a step 806, the client programming device 702 programs the video recording device 750 to record broadcast content by transmitting the programming commands 710 to the video recording device 750, preferably through the data port 708.

IV. Communication Link

Figures 9A-E illustrate five embodiments of the host communication module 312, the client communication module 524 or 704, and the communication link 130. Figures 9A-B illustrate point to point connections that allow bi-directional communication between the host system 102 and the video recording system 120. Figures 9C-E illustrate broadcast transmission configurations in which information is transmitted only from the host system 102 to the video recording system 120. As will be understood by one skilled in the art, various features of the described embodiments may be combined to incorporate their respective advantages into a single embodiment.

Figure 9A illustrates a basic embodiment in which the host communication module and the client communication module are both telephone modems 914, 916 connected through a telephone system or line 912. In one configuration, the video recording system 120 periodically calls the host system 102 (e.g. late at night) to check for and download programming data and to provide state information 122 to the host system. This configuration can be supplemented with a broadcast-type communication link (Figures 9C-E) in order to provide near instantaneous remote programming capabilities. In one embodiment, the host system 102 can be configured to use the telephone system 912 to call the video recording system 120 whenever the user 110 clicks on a "Transmit" button on a programming web page. Alternatively, the host system 102 can be configured to call the video recording system 120 just in time to transmit programming data 108 for a next scheduled recording event. These configurations provide instantaneous programming but may be inconvenient in that either an extra phone line is required or there may be contention for the use of a shared phone line.

In one embodiment, the recording system 120 (or the client programming device 702) can be configured with functionality available in some presently available fax machines so that two devices (e.g. client programming device and answering machine) can share a single telephone line. An answering machine message instructs the caller to press a number on the telephone keypad if the caller is sending a fax. The fax machine, upon detecting the resulting keypad tone, then takes over the call and receives a transmitted fax. In order to support near-instantaneous remote programming of a recording system 120, the recording system can be configured with similar technology to share a phone line with an answering machine and/or a fax. The host system can be configured to call the recording system and send an appropriate tone indicating that the call is specifically for the recording system. The recording system detects the tone, takes over the call, and communicates with the host system. Alternatively, the recording system can terminate the call upon receiving the tone from the host system and then call the host system back. In this configuration, the initial call from the host system can be used as a signal that synchronization is required (e.g., programming data is ready to be transmitted).

so that the recording system 120 can decrypt and present the content. The host system 102 preferably provides the key 1002 by encrypting the key such that it can be decrypted by the recording system 120 and transmitting the encrypted key 1006 in conjunction with programming data 108 to the recording system 120. Figures 10 and 11 will now be described concurrently in additional detail.

5 At a step 1102 of the method 1100, a proprietary content unit is digitally encrypted to create encrypted content unit 1004 that can be decrypted with a content decryption key 1002. The encrypted content 1004 is scheduled for broadcast by a broadcaster 1010 over a transmission infrastructure such as open-air, cable, or satellite television. The content unit can be encrypted by the broadcaster 1010, the owner of the content, or another party.

10 At a step 1104 the host system 102 obtains the content decryption key 1002 preferably from the broadcaster, the owner of the content unit, or the entity that encrypted the content unit. The transfer of the content decryption key 1002 from the broadcaster to the host system 102 is preferably performed using any secure communication or delivery method. The host system 102 preferably associates the content decryption key 1002 with the encrypted content unit 1004 so that the content decryption key can be supplied when a user chooses to record the content unit.

15 At a step 1106, the user 110 selects an encrypted content unit 1004 for recording in accordance with the present invention. In one embodiment, the host system 102 may bill the user for the content when the programming instructions 118 are received from the user. Alternatively, the host system 102 may defer billing until content use data 1030, which is described below, has been collected.

20 At a step 1108, the host system 102 encrypts the content decryption key 1002 to create an encrypted content decryption key 1006, which can be decrypted by the user's remotely programmable video recording system 120. By encrypting the content decryption key 1002, the host system is able to prevent the key 1002 from being intercepted and used by unauthorized parties. The host system may use a key encryption module 1020 to perform this encryption. Each video recording system 120 can be equipped with asymmetric key (e.g., public-private key) decryption technology that allows data to be encrypted by other devices only for decryption by the particular recording system. In this manner an encrypted content decryption key 1006 can be transmitted securely to a single video recording system 120.

25 At a step 1110, the host system 102 transmits the encrypted content decryption key 1106 to the user's video recording system 120 preferably in conjunction with programming data 108 for the requested proprietary program.

 At a step 1112, the video recording system 120 receives the encrypted content decryption key 1006 and the programming data 108.

30 At a step 1114, the video recording system 120 decrypts the encrypted content decryption key 1006 in order to obtain the content decryption key 1002. The decryption module 508 of the recording system 120 can be configured to decrypt the encrypted key 1006.

 At a step 1116, the video recording system 120 automatically records the encrypted video content 1004 when it is broadcast by the broadcaster 1004.

35 At a step 1118, the video recording system 120 decrypts the recorded encrypted content 1004 using the content decryption key. The decryption module 508 of the recording system 120 can be configured to decrypt the encrypted content 1004 using the content decryption key 1002. In one embodiment, the decryption module 508 can decrypt the content 1004 as the content is received such that the decrypted content is then stored by the video recording and replay module 502. Alternatively, the content 1004 can be stored in encrypted form for subsequent decryption during playback.

40 At a step 1120, the user preferably uses a hand held remote control to operate the video recording system 120 to present the decrypted video content.

In one embodiment, the web server 302 (Figure 3) hosts the selectable object 1204. In the process of requesting the selectable object 1204 from the web server 302, the web browser 112 supplies an identifying cookie to the web server 302. In this manner, the web server 302 can identify the user 110 before the user views the selectable object 1204. The web server 302 then responds with the selectable object 1204 that presents to the user an option to record a particular program that the host system 102 has already confirmed is scheduled to be broadcast to the user's video recording system 120. In one configuration, the selectable object 1204 leads to a web page (not illustrated) on the web site 104 that preferably confirms the user's decision to record the program. In one embodiment, the user's single action of clicking on a selectable object 1204 can be sufficient to cause the host system 102 to remotely program the user's video recording system 120.

Clickable icons 1204 and the program-identifying links 1202 can be implemented using banner ad technology such as is provided by the well-known banner advertisement company DoubleClick, Inc. In accordance with the present invention however, the destination links of banner advertisements can be configured to cause a user's video recording device to be programmed.

As will be understood by one skilled in the art, the features of this Section can be combined with the features of Section V (Distribution of Proprietary Content) above in order to advertise the availability of proprietary content for distribution.

In one embodiment, a user can be presented with a banner advertisement that advertises, instead of a program or movie, a broadcast commercial or video advertisement that the user may be interested in watching. The banner advertisement can be configured in accordance with the techniques disclosed in this Section to cause the user's remotely programmable video recording device to record the advertised commercial. The user can then watch the commercial at a convenient time rather than when the commercial happens to be broadcast. DoubleClick, Inc. provides technology that allows banner ads to be targeted to users browsing the web based upon the user's previous selections. This technology, in addition to other ad-targeting technology can be used to target users with banner advertisements that advertise commercials that may be of particular interest. Since commercials can be easily recorded by users' recording devices, commercials can be broadcast less frequently, such as once per day. In accordance with this embodiment, commercials can be more effectively targeted to viewers, viewers can avoid watching commercials that are not of interest, and advertisers can avoid paying to repeatedly broadcast the same commercial.

VII. Program Request Integration

Local cable television service providers generally have at least a hundred and sometimes several hundred channels upon which to broadcast content. Oftentimes, it may be the case that many of these channels are not watched by even a few people within a whole service area for extended periods of time, such as late at night. Viewers will frequently find scrolling text ads, low-viewership programs, and paid commercial advertising on these channels late at night. The result is that a tremendous amount of bandwidth is wasted during late night and off-peak hours. In accordance with one embodiment of the invention, this bandwidth is used to distribute content that is recorded and then watched during more convenient viewing hours.

Figure 13 illustrates one embodiment 1300 in accordance with which users can request that certain content be broadcast through a scheduling system 1302. When content is scheduled to be broadcast in response to a request, the host system 102 automatically sends programming data to the user's remotely programmable video recording system 120 to cause the system to record the requested content.

In one embodiment, the programming web site 104 provides a search utility that allows a user 110 to search for a particular content unit of interest. It may be the case that the content unit is not scheduled to be broadcast at all or that the content unit is scheduled to be broadcast too far in the future. In such cases, the programming web site 104 can present the user 110 the option of making a scheduling request 1310 that the content unit of interest be scheduled for broadcast at some

A broadcaster can use the collected statistics to determine the frequency at which to rebroadcast repeating content or serial programs. Suppose, for example, that a broadcaster broadcasts movies on a certain channel. A movie can be scheduled for rebroadcast at a rate (e.g., hours of movie per day) that is proportional to the rate (e.g. number of requests, per hour of movie, per day) at which users record the movie. Movies that are requested less frequently can be broadcast less frequently. By scheduling content with a rate that is proportional to the rate at which the content is recorded, the average number of users recording content from the channel can be maximized.

The statistical information obtained from the host system can also be used to determine when to schedule programs. Programs that are recorded more frequently can be broadcast before or during peak watching hours in order to reduce or minimize the amount of time an average user will have to wait to watch a program.

IX. Recording Other Types of Content

In one embodiment, the present invention can be configured to record other types or forms of content that can be broadcast in digital form, such as audio content, data, or software. In order to capture these varied types of content, a computer can be configured with a digital broadcast signal receiver to receive broadcast content. Any type of content can then be digitally encoded and broadcast through a digital broadcast signal, such as available digital television bandwidth. iBlast, Inc. (www.iblast.com) provides technology that enables computers to receive various types of digitally encoded broadcast content. In accordance with the technology of the present invention, computers can be further configured to receive programming data through which they can be programmed to record or store broadcast content. In addition, any type of broadcast can be encrypted and decryption keys can be encrypted and transmitted to individual receiving computers to provide a general proprietary content distribution system in accordance with the techniques presented in Section V.

In one embodiment, the recording system 120 can be configured to receive broadcast FM radio or to receive digital radio stations that are provided by many cable and satellite television service providers.

X. Web Server Enabled Video Recording System

Figure 14 illustrates one embodiment of the invention in which a content recording device 1402 is supplemented with a web server 1404 to provide a point of presence on the World Wide Web. The web server 1404 can be configured to serve a small number of web pages 1406 that enable a user 110 to program the recording device 1402 through a web browser 112. The web pages 1406 can include a Login Page 200 (Figure 2A), a Clickable Programming Page 210 (Figure 2B), a Program Schedule Page 220 (Figure 2C), and a Setup Page such as are described in Section I.

The content recording device 1402 is preferably based upon a computer system platform so that little or no additional hardware is necessary to support the web server 1404. Alternatively, the device 1402 can be a computer system supplemented with a digital broadcast signal receiver (e.g., in accordance with iBlast, Inc. technology). Presently available digital video recorders are generally based upon stripped-down computer systems and little or no hardware would have to be added in order to run a web server 1404. The TiVo personal video recorder, for example, is essentially a stripped down computer system that runs the Linux operating system and has an MPEG-2 video codec. Alternatively, a separate computer system can be used to support the web server 1404.

In accordance with this embodiment, much of the functionality of the host system 102 can be incorporated into the web server 1404, eliminating the need for a separate host system 102. The web server 1404 can also include any ancillary programs (e.g., CGI scripts) necessary to generate web pages, process web page requests, and/or receive and process received programming instructions 118. The web server 1404 and a programmable recording module 1408 are preferably connected in communication in a single device.

be programmed directly by the user. In this configuration, the set-top box can use received programming schedules to schedule the recording of encrypted content. The set-top box can also request and receive decryption keys from a host system. The host system can in turn bill the requesting user for content for which decryption keys are provided.

5 In one embodiment, the host system can be configured to receive e-mail from users, wherein programming instructions are included in the e-mail. A user can compose an e-mail message on any e-mail capable device, such as, for example, a computer, a digital phone with e-mail capability, or a personal digital assistant. The e-mail preferably contains an identifier of the user and an identifier of the content unit to be recorded. The user can be identified by a return address of the e-mail or by another identifier, such as a user ID included in the e-mail. The content unit can be identified using, for example, a VCR-Plus (Video Plus) code or any other coding scheme. The host system can be configured to receive and process the e-mail in accordance with known techniques in order to identify the user and the content unit to be recorded. The host system can then program the remotely programmable video recording to record the selected content in accordance with the present invention.

10 In one embodiment, a specially configured client program can be configured to run on a user computer 114 to allow a user 110 to send programming instructions 118 to the host system 102 without using web pages. The client program can provide a simple interface through which CDTL data is entered. The client program and a remotely programmable recording device 120 can alternatively be configured to communicate with one another through a computer network. In these configurations, the client program can provide a remote user interface to the remotely programmable recording device 120 without using a web browser or web pages.

15 In certain instances, such as when recording short content units (e.g., commercials) it is advantageous to configure the timing of a recording session to correspond precisely with the broadcast of a content unit. Gemstar International Group Limited provides technology whereby indication signals that signal the precise beginning and end of content units are broadcast in conjunction with the content units. The indication signals can be received by recording devices and used to precisely time the recording of content. These signals can account for the unplanned shifting of the time of broadcast content due to delays such as sporting events.

20 In one embodiment, the web pages 106 of the web site 104 can be coded using VoiceXML, the web browser 112 can be a voice web browser, and the user computer 114 on which the voice web browser executes can be a VoiceXML gateway. In accordance with known techniques, the VoiceXML, the voice web browser, and the VoiceXML gateway are configured so that a user can browse web pages by listening to speech synthesized VoiceXML pages and responding with voice commands that are interpreted with automated speech recognition technology. In this embodiment, the user can call a VoiceXML gateway on the telephone, listen to various options of content to be broadcast and provide programming instructions via voice commands. Additional information on VoiceXML is available from www.voicexml.org.

25 XII. Conclusion

One skilled in the art will recognize that many of the functions of the various functional blocks and modules described can be performed by alternative functional blocks and modules. For example, in one embodiment, the web server 302 of the host system 102, instead of the control module 310, can be configured to create the programming data 108.

35 One skilled in the art will recognize that the various embodiments of the invention disclosed herein can be combined in a single embodiment. Furthermore, the functionality disclosed with respect to certain embodiments need not be included in all embodiments.

While certain embodiments have been described and shown in the accompanying drawings, it is to be understood that such embodiments are merely illustrative of and not restrictive on the broad invention. Further, it is to be understood that

WHAT IS CLAIMED IS:

1. A method of programming a remotely programmable content recording system to record broadcast content, the method comprising:

(a) receiving a programming instruction transmitted over a computer network by a user computer in response to a user's input to the user computer, wherein the programming instruction identifies broadcast content that has been selected by the user to be recorded by the remotely programmable content recording system; and

(b) using the received programming instruction to program the remotely programmable content recording system to record the identified content.

2. The method of Claim 1, wherein the user's input is received through a web browser executing on the user computer.

3. The method of Claim 2, wherein the user's input to the user computer comprises a selection of a user-selectable display element.

4. The method of Claim 3, further comprising transmitting a web page to the user computer, wherein the web page is configured to cause the web browser to display the user-selectable display element.

5. The method of Claim 2, further comprising transmitting a programming web page to the user computer in response to a request transmitted by the user computer, wherein the programming web page comprises code configured to cause the web browser to display to the user an identification of the broadcast content.

6. The method of Claim 5, wherein the programming web page further comprises code that configures the web browser to receive the input from the user.

7. The method of Claim 2, further comprising serving a state web page in response to a request transmitted by the user computer, wherein the state web page comprises code configured to cause the web browser to display state information descriptive of a state of the remotely programmable content recording system.

8. The method of Claim 7, wherein the state information comprises an amount of storage capacity available on the recording system for recording new content.

9. The method of Claim 1, wherein (b) is performed by the remotely programmable content recording system.

10. The method of Claim 1, wherein the computer network is the Internet.

11. The method of Claim 1, wherein the programming instruction identifies a broadcast television program.

12. The method of Claim 1, wherein the programming instruction identifies a time period and a broadcast channel.

13. The method of Claim 1, wherein the programming instruction comprises a VIDEO PLUS code.

14. The method of Claim 1, wherein the broadcast content is broadcast television content.

15. The method of Claim 1, wherein the broadcast content is audio content.

16. The method of Claim 1, wherein the broadcast content is digital video content.

17. The method of Claim 1, wherein the broadcast content is computer software.

18. The method of Claim 1, wherein the remotely programmable content recording system comprises a programmable content recording device and a separate programming device configured to receive programming data, wherein the programming device is connected in at least one-way communication with the programmable content recording device.

19. The method of Claim 1, wherein (b) comprises

36. A host system for remotely programming a remotely programmable content recording system, the host system comprising:

5 a server configured to receive a programming instruction transmitted over a computer network by a user computer, wherein the programming instruction is transmitted in response to a user's input to the user computer, and wherein the programming instruction identifies broadcast content that has been selected by the user to be recorded by the remotely programmable content recording system;

a control module configured to create programming data based at least upon the programming instruction, wherein the programming data are configured to cause the remotely programmable content recording system to record the identified broadcast content; and

10 a communication module configured to transmit the programming data to the remotely programmable content recording system.

37. The system of Claim 36, wherein the server is a web server and wherein the user's input is received through a web browser executing on the user computer.

15 38. The system of Claim 37, wherein the web server is further configured to serve a programming web page to the web browser in response to a request transmitted by the web browser, wherein the programming web page comprises code configured to cause the web browser to display to the user an identification of the broadcast content.

39. The system of Claim 38, wherein the programming web page further comprises code that configures the web browser to receive the input from the user.

20 40. The system of Claim 36, further comprising a computer system comprising a processor and an operating system, wherein the server, the control module, and the communication module are configured to operate under the control of the computer system.

41. The system of Claim 40, wherein the computer network is the Internet.

42. The system of Claim 36, wherein the broadcast content is broadcast in encrypted form.

25 43. The system of Claim 42, wherein the control module is further configured to transmit a content decryption key to the remotely programmable content recording system, wherein the content decryption key can be used to decrypt the broadcast content.

44. The system of Claim 43, wherein the control module is further configured to encrypt the content decryption key to enable secure communication of the key to the remotely programmable content recording system.

45. The system of Claim 36, wherein the server and the control module are integrated.

30 46. A remotely programmable broadcast content recording system, the system comprising:
a programmable broadcast content recording module;

a server configured to receive a programming instruction transmitted over a computer network by a user computer, wherein the programming instruction is transmitted in response to a user's input to the user computer, and wherein the programming instruction identifies broadcast content that has been selected by the user to be recorded by the programmable content recording module; and

35 a communication module configured to enable access to the server to be initiated from a computer network.

47. The system of Claim 46, wherein the server is a web server and wherein the user's input is received through a web browser executing on the user computer.

transmitting a content decryption key to the remotely programmable content recording system, wherein content decryption key can be used to decrypt the broadcast content unit.

64. The method of Claim 63, wherein the content decryption key is encrypted in such a manner that the content decryption key can be decrypted by the remotely programmable content recording system.

5 65. A method of programming a remotely programmable content recording system to record broadcast content, the method comprising:

(a) associating a user with the remotely programmable content recording system;

(b) authenticating the user through a web browser executing on a user computer;

(c) in response to at least (b), placing a web browser cookie on the user computer;

10 (d) receiving the cookie in conjunction with a programming instruction, wherein the programming instruction identifies broadcast content that has been selected by the user to be recorded by the remotely programmable content recording system; and

(e) in response to at least (d), causing the remotely programmable content recording system to record the identified content.

15 66. The method of Claim 65, wherein the cookie and the programming instruction are transmitted by the user computer in response to a selection by the user of a hypertext link displayed on a web page.

67. The method of Claim 65, wherein the hypertext link is associated with a banner advertisement.

68. A method of programming a remotely programmable content recording system to record broadcast content, the method comprising:

20 (a) associating a user with the remotely programmable content recording system;

(b) authenticating the user through a web browser executing on a user computer;

(c) in response to at least (b), placing a web browser cookie on the user computer;

(d) receiving the cookie in conjunction with a request from the web browser;

25 (e) in response to at least (d), identifying a content unit that is scheduled to be broadcast and receivable by the remotely programmable content recording system and transmitting data to the web browser to thereby cause the web browser to provide an identification of the content to the user;

(f) receiving a programming instruction transmitted by the web browser in response to an action by the user; and

30 (g) in response to at least (f), causing the remotely programmable content recording system to record the broadcast of the identified content unit.

69. The method of Claim 68, wherein the request is a request for an image file and wherein the data comprise the image file.

70. The method of Claim 68, wherein the request is a request for a web page and wherein the data comprise the web page.

35 71. The method of Claim 68, wherein the programming instruction identifies the content unit.

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The image shows a screenshot of a web browser window. The browser's title bar is empty. The menu bar includes File, Edit, View, Go, Favorite, and Help. The toolbar contains icons for Back, Forward, Stop, Refresh, Home, Search, Favorite, Print, Font, and Mail. The address bar is labeled "Address" and contains a dropdown arrow. The main content area displays the "Remote Video Recorder Login Page" with the page number 200. Below the title, there are two input fields: "User:" followed by a text box labeled 202, and "Password:" followed by a text box labeled 204. At the bottom left, there is a button labeled "LOGIN" labeled 206.

Remote Video Recorder Login Page 200

User: 202

Password: 204

206

FIG. 2A

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File Edit View Go Favorite Help

Back Forw... Stop Refresh Home Search Favorite Print Font Mail

Address

Program Schedule Page 220

Manually Add Programs 222

Date	Start	End	Channel	Size	Title
2/15/00	22:00	23:00	4 KNBC	1.8	Dateline NBC

Recording Schedule 224

Date	Start	End	Channel	Size	Title	Cancel?
2/15/00	21:00	21:30	4 KNBC	0.9	Will & Grace	
2/15/00	23:00	23:30	7 KABC	0.9	News	
2/16/00	21:00	22:00	13 KCOP	1.8	Star Trek: Voyager	X

Recorded Programs 226

Date	Start	End	Channel	Size	Title	Cancel?
2/08/00	21:00	21:30	4 KNBC	0.9	Will & Grace	X
2/09/00	21:00	22:00	13 KCOP	1.8	News	

Digital Recording Capacity 228

2.7 Gigabytes Used
3.6 Gigabytes Reserved
11.7 Gigabytes Available
18 Gigabytes Total

UPDATE PAGE 230

TRANSMIT 232

[Go To Clickable Programming Page](#)

[Logout](#)

FIG. 2C

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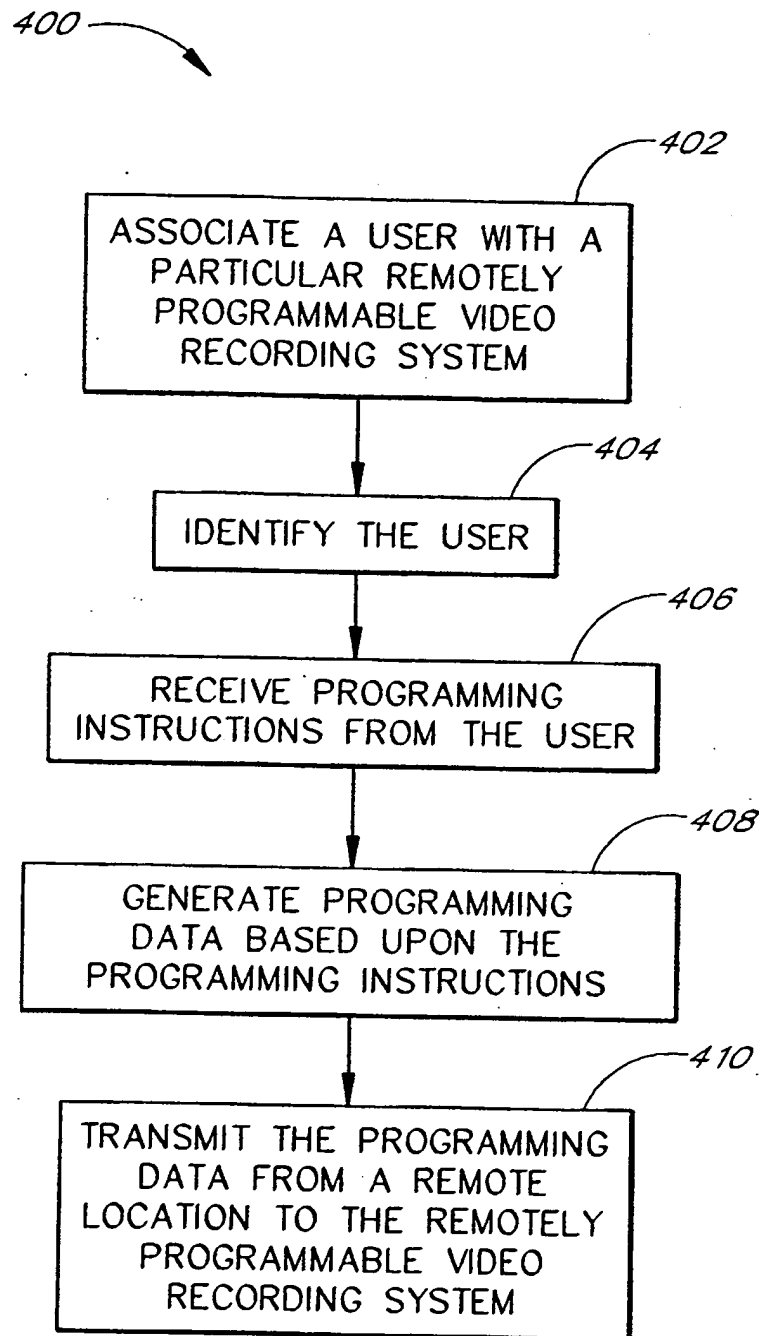


FIG. 4A

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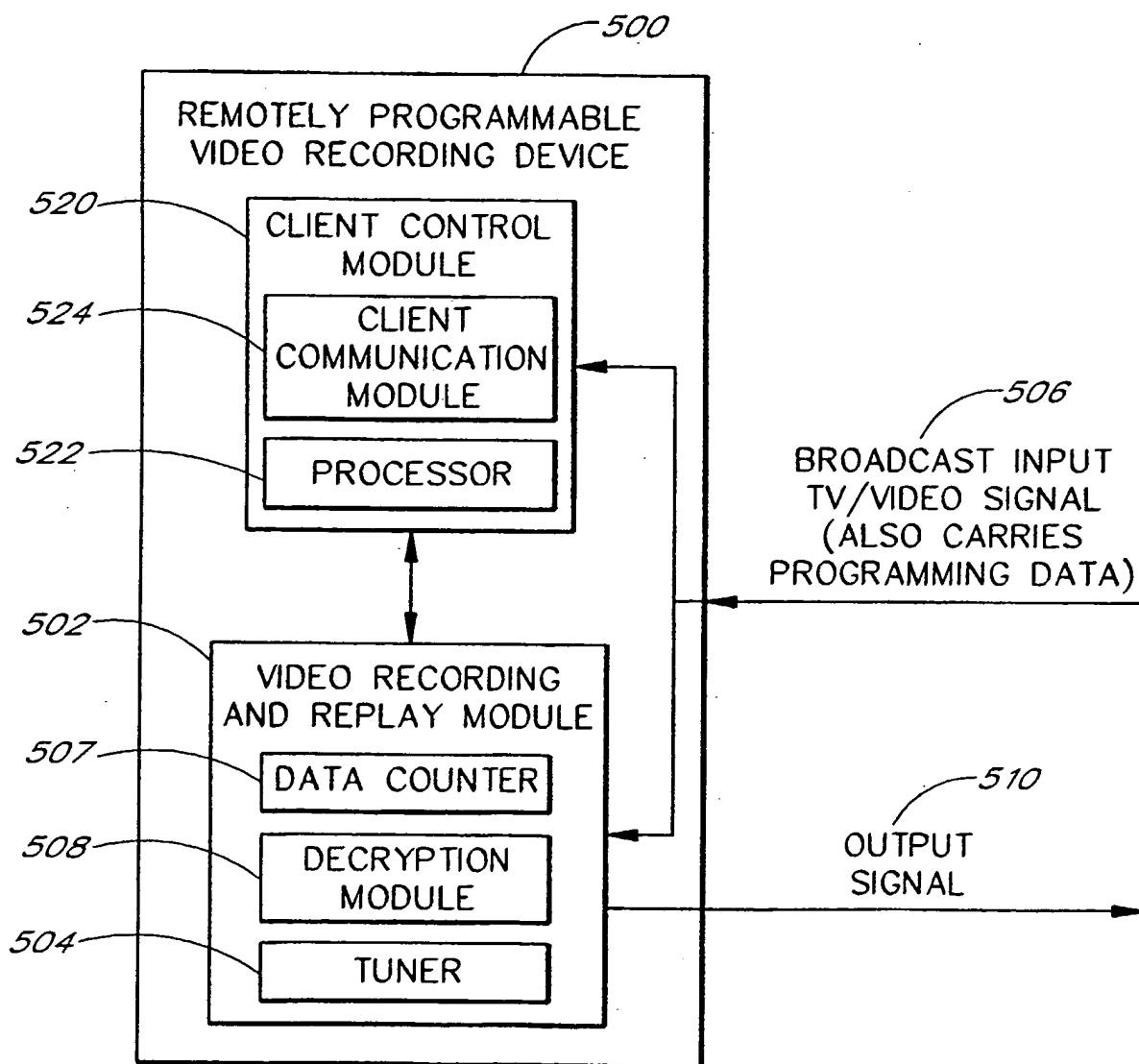
REMOTELY PROGRAMMABLE
VIDEO RECORDING SYSTEM

FIG. 5

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REMOTELY PROGRAMMABLE VIDEO RECORDING SYSTEM

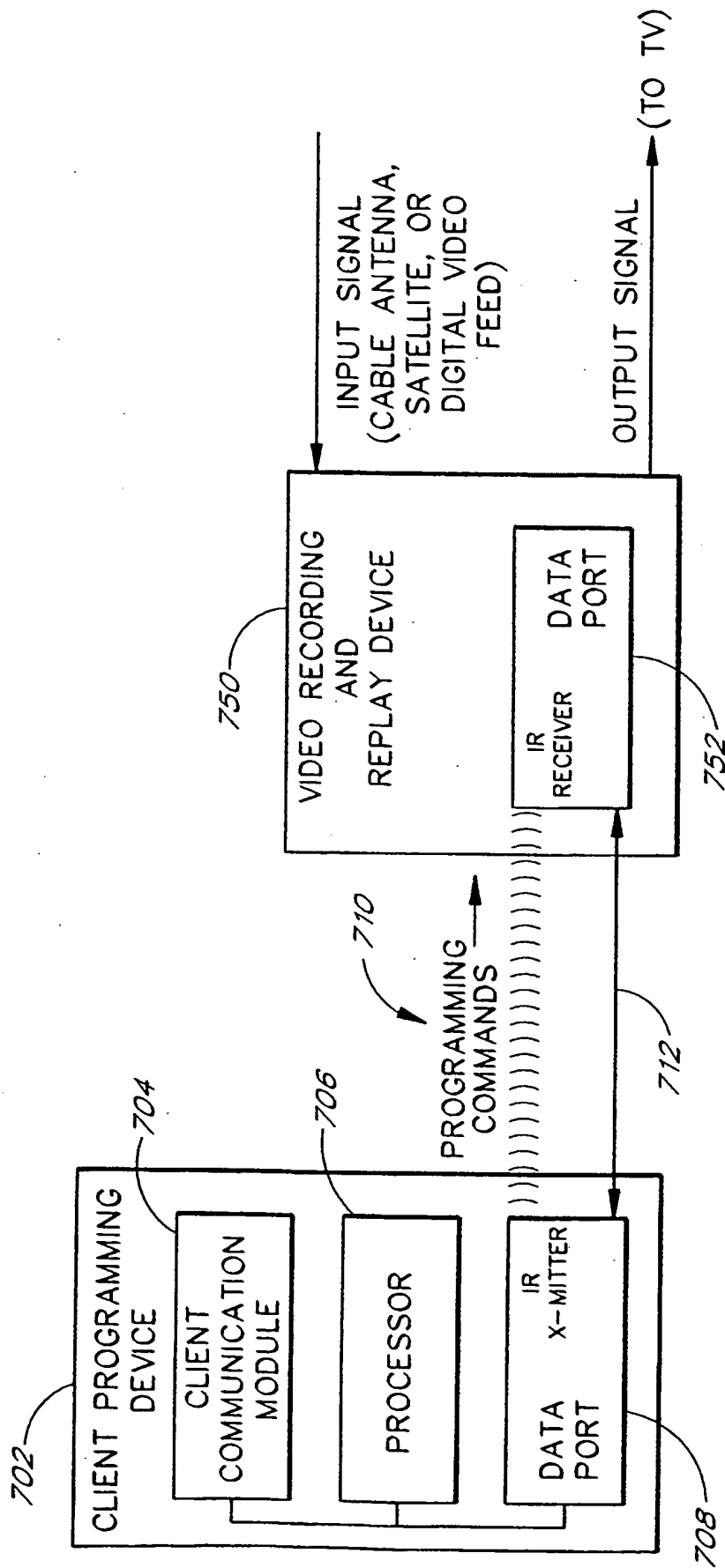


FIG. 7

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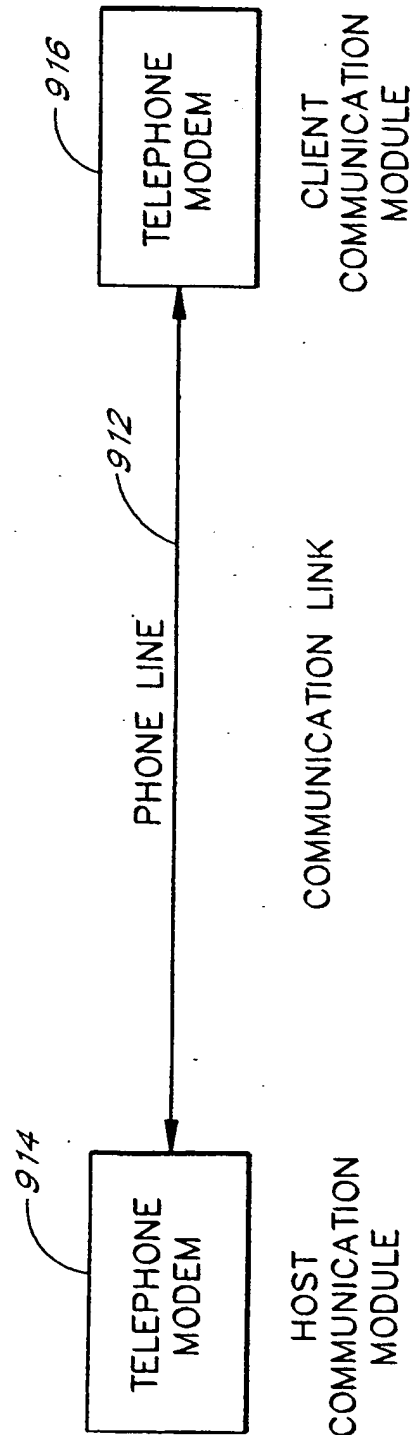


FIG. 9A

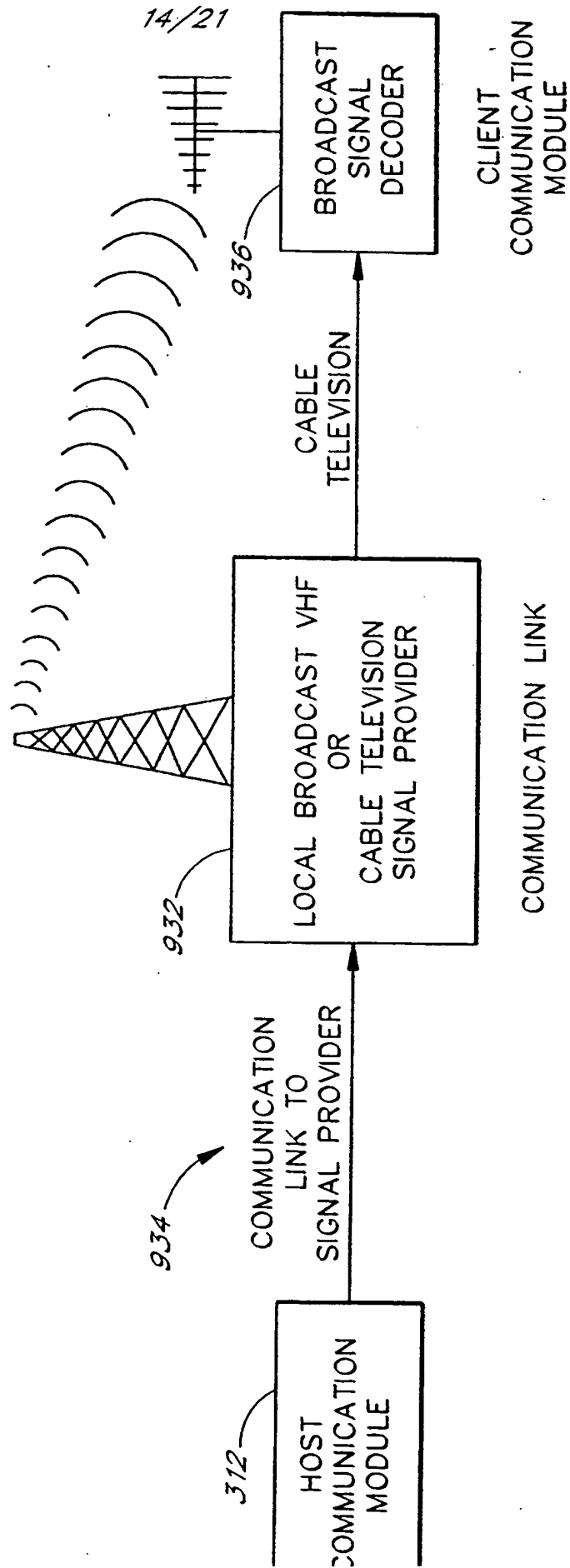
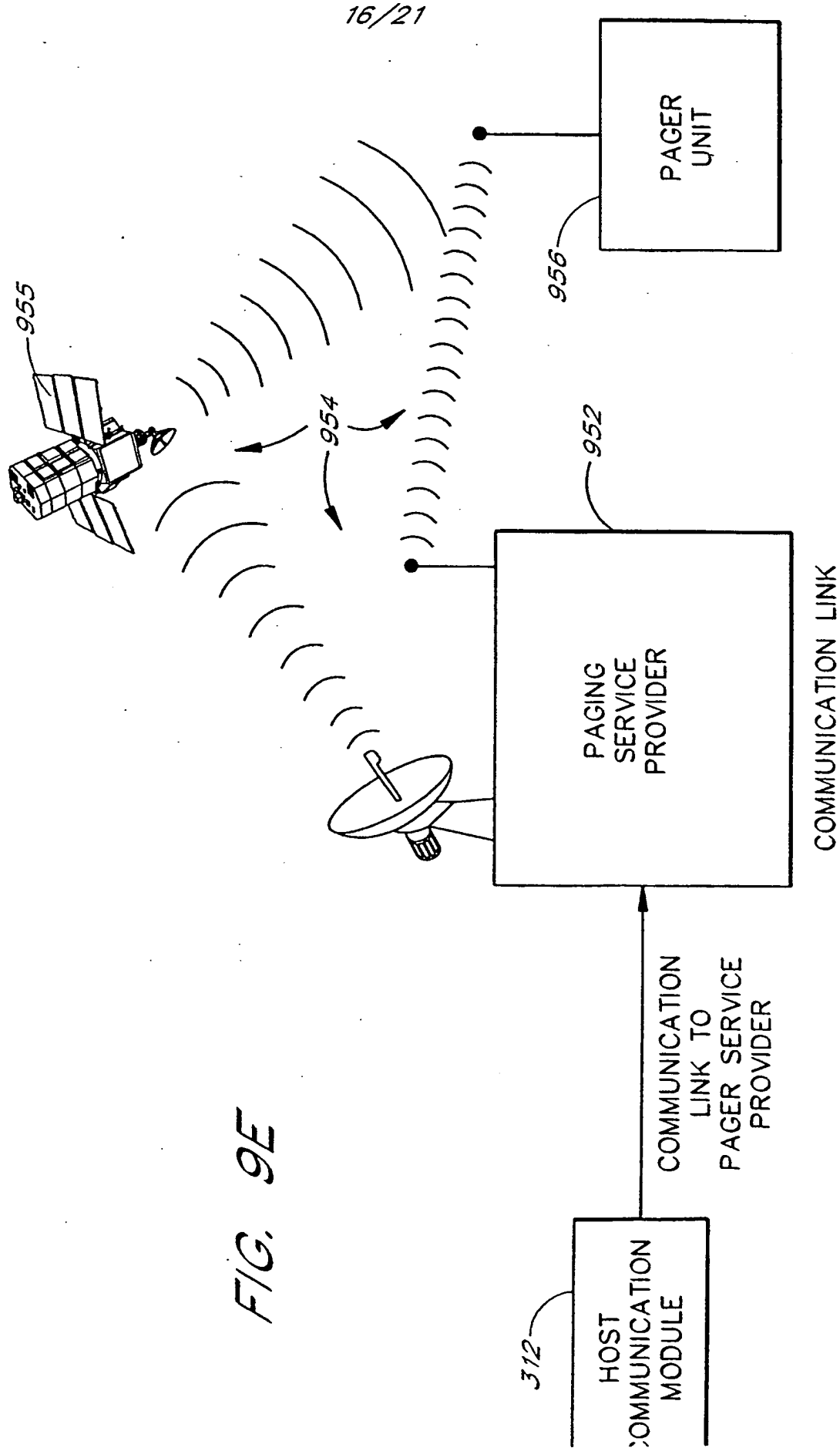


FIG. 9C



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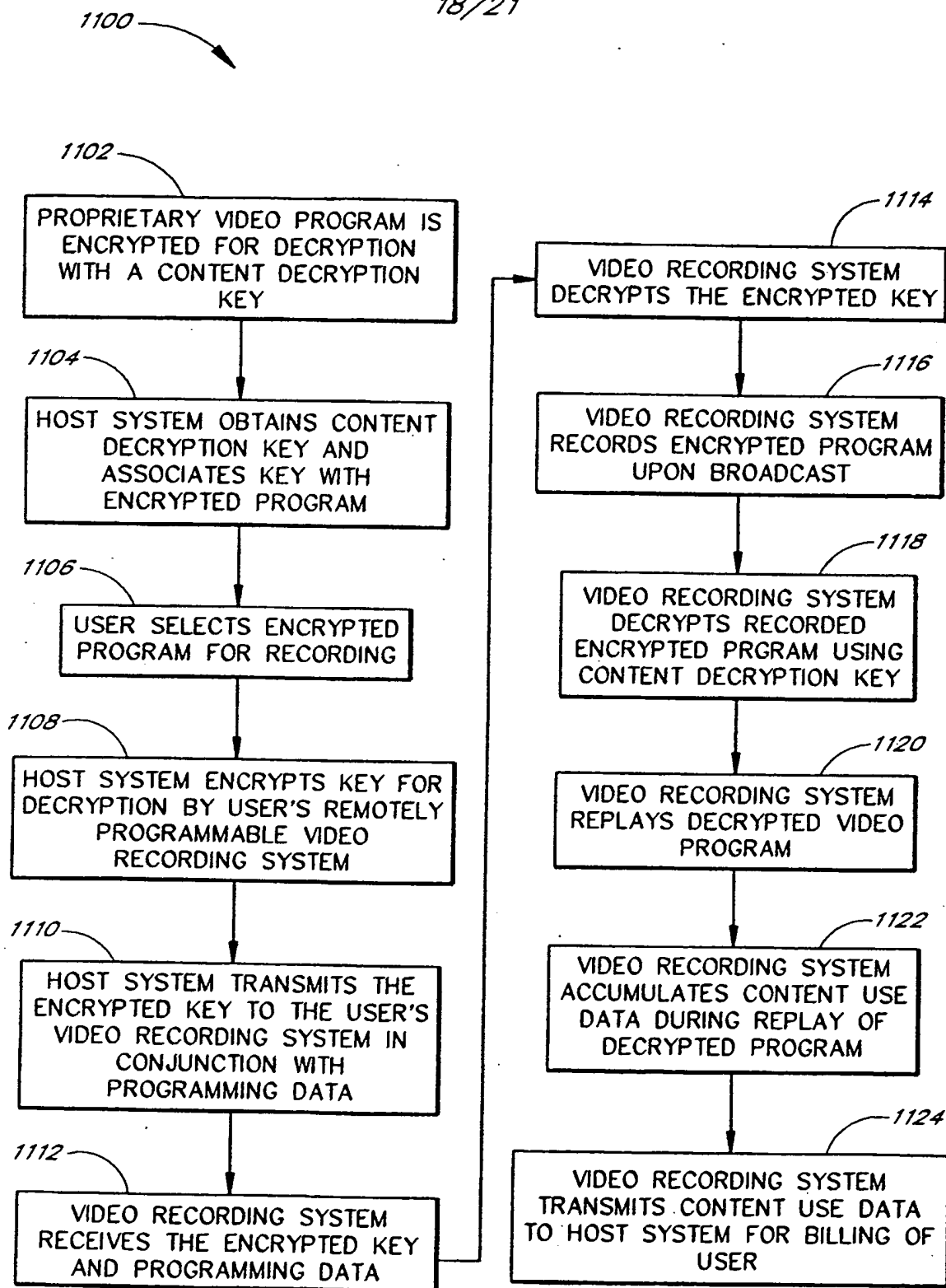


FIG. 11

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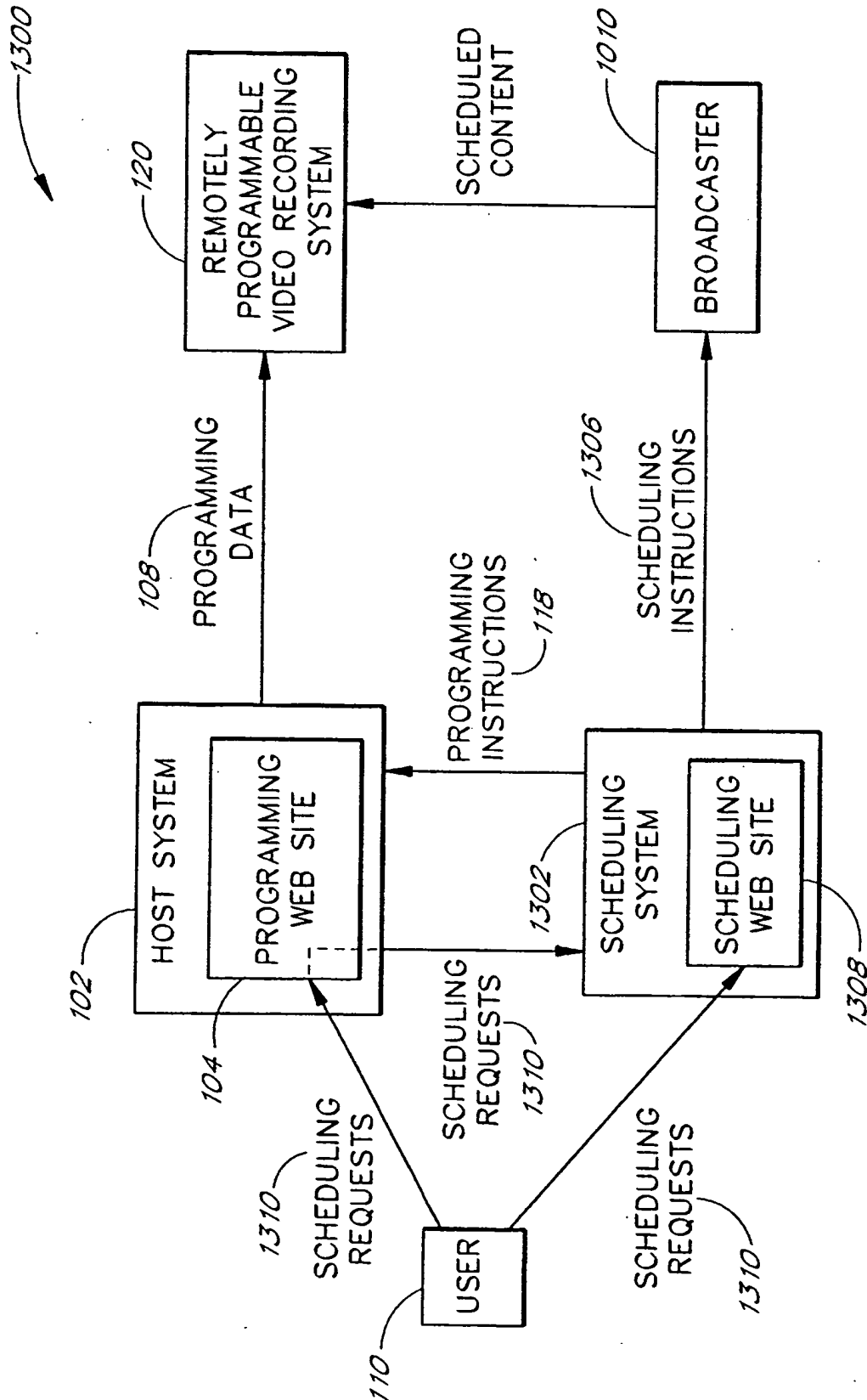


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/05439

FILE COPY

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04N 5/76

US CL : 386/46, 83

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 386/46, 83, 95; 348/14.03, 906; 725/21

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WEST SEARCH

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96/13932 A1 (NG) 09 May 1996 (09.5.1996), pages 7-8.	60
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Y		1-59, 65-71
X	US 4,605,973 A (VON KOHORN) 12 August 1986 (12.8.1986), columns 7-8.	60
Y	US 5,850,218 A (LAJOIE et al) 15 December 1998 (15.12.1998), columns 8, 14, 17, 18.	1-71
Y	US 5,016,273 A (HOFF) 14 May 1991 (14.5.1991), column 9, lines 25-68.	1-71
Y	US 5,875,296 A (SHI et al) 23 February 1999 (23.02.1999), column 6, lines 47-68.	65-71
Y	US 5,933,827 A (COLE et al) 03 August 1999 (03.8.1999), column 10	1-71

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

12 May 2001 (12.05.2001)

Date of mailing of the international search report

20 JUN 2001

Name and mailing address of the ISA/US

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